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THE PLANT DISEASE SURVEY

DIVISION OF MYCOLOGY AND DISEASE SURVEY

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DISEASES OF FRUIT AND NUT CROPS

A SEVERE OUTBREAK OF LEAF RUST ON CULTIVATED RASPBERRY IN NEW YORK

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Specimens of Latham red raspberries sent from Herkimer, Herkimer County, New York, on September 1 were found to be heavily infected with the leaf rust caused by Pucciniastrum americanum (Farl.) Arth. The identification was made by Dr. F. D. Kern. Further correspondence with the owner revealed that his entire planting of over 5000 Latham plants was attacked. On a visit to the planting made September 10, the grower's report was found to be no exaggeration. The under surface of the leaves of every cane up to the terminal foot was covered with the yellow spores and many of these leaves showed scattered sori. Even the new suckers were uniformly attacked. Affected wild red raspberries were found growing in the fence-row bordering one edge of the planting. The leaves of the Latham plants nearest to the fence-row were turning brown and dropping off from the lower two feet of the canes, while in the row farthest from the fence-row there was practically no browning of the lower leaves. This indicated that the Latham plants near the wild plants first became infected and later the rust spread through the patch. This was corroborated by the grower's statement that he first noted the yellow coating on the leaves in late June in the row adjoining the fence-row. Considerable amounts of pedicel infection and moderate amounts on the canes were observed.

A portion of the row adjoining the fence-row was filled in with a dozen Cumberland black raspberry plants. These plants were carefully examined for evidences of the leaf rust and one leaf was found to have a single lesion which was definitely identified as P. americanum.

Several collections of wild red raspberry plants made along Steel Creek between Ilion and East Winfield, Herkimer County, were infected with P. americanum but were not nearly so severely attacked as was the Latham variety. Wild black raspberry plants growing intertwined with the wild red varieties showed no lesions of P. americanum. Telia of Gymnoconia interstitialis (Schl.) Lagh. were abundant on the leaves of these wild black raspberry plants.

A similar severe attack on cultivated red raspberries were reported from Geneva in 1923 by W. H. Rankin, who noted that no appreciable injury resulted from the heavy infection and that the rust did not carry over winter on the raspberry. So far as the writer is aware this rust has been reported in literature only once as being economically important on cultivated raspberries (Dodge, B. O. Morphology and host relations of Puccinias-trum americanum. Jour. Agric. Res. 24: 885-894. 1923).

PINK ROT ON PECAN IN GEORGIA

J. B. Demaree, pathologist of the Division of Horticultural Crops and Diseases at Albany, Georgia, sent specimens of Schley pecans with scab infection (Cladosporium effusum) followed by pink rot (Cephalothecium roseum). Dr. M. B. White, who has transmitted this report, states that pink rot appears rather often following scab on pecan, but is not usually so abundant. Demaree's report is as follows:

> "This secondary fungus is very abundant in South Georgia this year. In fact, I have never known it to do so much damage as it is now. Two of the nuts that I am sending you, wrapped together, have little or none of the pink rot fungus and the damage done is what we usually expect as the result of a light infection of scab. The other nuts do not have a great number of infections--not sufficiently enough to destroy the nuts. But most of the damage has been done by the other fungus, which causes a much deeper lesion.
>
> "This secondary infection, I believe, has done more damage in sprayed orchards this year than scab."

DISEASES OF CEREAL CROPS

STEM RUST OBSERVATIONS IN NEBRASKA, 1931

Observations in Nebraska during the 1931 season revealed no widespread epidemic of black stem rust. Owing to the heat and drought in western and northern Nebraska, rust development was largely confined to the southeastern quarter of the State.

The first infection of the season on small grain was observed in the vicinity of Lincoln on June 4. An intensive rust survey was carried on, immediately preceding harvest, in a block of southeastern counties revealed stem rust infection ranging from a trace in many instances to a severity of 30 per cent with a 100 per cent prevalence in isolated fields. This range in degree of infection held true for wheat, oats, barley and rye.

Stem rust losses for 1931 in Nebraska probably did not amount to more than a trace and this was largely confined to the southeastern quarter of the State. (M. E. Yount)

DISEASES OF SPECIAL CROPS

DISEASE SURVEY OF TOBACCO FIELDS IN PENNSYLVANIA, 1931

W. S. Beach

A survey of tobacco fields for the occurrence of diseases was made August 18 in Clinton County and August 25 to 29 in Lancaster, Chester and York Counties. The survey was delayed until the cutting season in order that the maximum prevalence of the various leaf spot diseases might be noted. For the most part, the same farms were visited as in the case of the seed bed survey. Detailed data were taken upon 70 farms while a considerable number of roadside fields were checked merely for the presence of wildfire or other leaf spots.

The season has been favorable for the development of most of the diseases common in the locality and the losses are greater than average. Aside, however, from the portion damaged by leaf spot diseases and some cases of severe growth reduction caused by black root rot, the crop in Pennsylvania is good in yield and promising in quality. In Clinton County,

growing conditions were rather uniformly favorable, the crop was early and serious disease damage was in large measure escaped. In Lancaster County, excess rainfall early in July brought about shallow rooting as well as conditions favorable to black root rot and the development of wildfire. The excess rainfall was then followed by a midsummer drought which, on account of unsatisfactory root conditions, caused decided checking of growth in many fields. Rainfall in August came soon enough, however, to help the crop and late growth was rapid.

The latter part of the season had several closely following periods of rainfall in which wildfire (Bacterium tabacum) was spread, and the damage caused by this disease is probably the greatest known to the locality. Although there were no severe storms or wind-driven rains, the frequent recurrence of moderate rainfall provided conditions for gradual spread by splashing. As some fields became over-mature on account of the delay caused by bad weather, the development of blackfire (non-parasitic) added much to the loss. Angular leaf spot (Bacterium angulatum) was only occasional and then slight or moderate in occurrence.

Total damage caused by the leaf spot diseases, resulting in a loss of grade, ranged from 10 to 40 per cent or more on approximately 30 per cent of the farms and from 2 to 10 per cent on 32 per cent of the farms. The balance had a loss of less than 2 per cent. A summary of the occurrence of wildfire is given in the accompanying table, which is made to correspond to the recent summary of wildfire occurrence in Maryland given by Jehle and Heuberger (Fl. Dis. Reptr. 15: 125. Oct. 1, 1931. No. 12). The data from the two states bring out essentially the same facts, the most important of which is that severe losses from wildfire in the field were experienced only when the fields had been set with plants from diseased seed beds. While some severe field losses were experienced in cases in which only slight amounts of disease had been present in the seed bed, there appeared to be at least a rough relationship between the degree of seed bed spotting and the severity of loss in the field. Earliness of maturity was a considerable factor in determining the amount of loss where diseased seedlings had been set out. The worst losses were experienced where field spotting gained headway during the rainy period early in July. Emergency efforts at sanitation after infections in the seed bed had been observed proved of value in only a few cases.

Summary of Wildfire occurrence in Pennsylvania tobacco fields, 1931.

County	Total number fields inspected	Number fields with following estimated loss from Wildfire	Number fields set from beds free from Wildfire	Number fields set from beds with Wildfire	Losses from Mosaic
Clinton	15	8 none	8	0	
		0 very slight			1 very slight
		2 slight	1	1	
		4 moderate	1	3	6 slight
		0 severe			8 moderate
		1 very severe	0	1	
Lancaster	50	11 none	11	0	9 very slight
		13 very slight	11	2	
		3 slight	1	2	18 slight
		7 moderate	2	5	21 moderate
		15 severe	0	15	2 severe
		1 very severe	0	1	
Chester	3	2 none	2	0	3 moderate
		1 slight	undetermined		
York	11	9 none	9	0	1 very slight
		2 slight	undetermined		1 moderate
					9 undetermined
Total	79	30 none	30	0	11 very slight
		13 very slight	11	2	24 slight
		8 slight	2	3	33 moderate
		11 moderate	3	8	2 severe
		15 severe	0	15	0 very severe
		2 very severe	0	2	9 undetermined

Very slight - Loss less than 0.5 per cent.
Slight - Loss 0.5 to 2 per cent.
Moderate - Loss 2 to 10 per cent.
Severe - Loss 10 to 40 per cent.
Very severe - Loss 40 per cent or more.

The development of Wildfire in a considerable number of fields - amounting to approximately 20 per cent of the observed instances - when the disease was not found in the seed bed lacks definite explanation. Some instances of such Wildfire development may be due to rather late and unobserved seed bed contamination resulting in the infection of the few plants required to replace the last missing hills, while others

may be due to the purchase of plants from a source not thoroughly investigated. The considerable period of wet weather during which workers or other carrying agencies might contaminate new fields, no doubt, would explain some cases, as instances of the infection of solitary upper leaves were observed. However, the large proportion of inadequately explained cases would indicate that the bacteria are surviving the winter on the open field, perhaps along borders, in infected tobacco refuse that fails to be plowed under. In general, the proximity of neighboring fields in Lancaster County where numerous small farms grow tobacco would appear to be a factor in the farm to farm dissemination of the disease.

The situation with respect to the control of Wildfire and other diseases deriving from the seed bed appears to require better understanding and application of sanitary measures on the part of the farmer. A discontinuance of the permanent seed bed in Pennsylvania would be advantageous, as so often the aisles and adjacent ground lie uncultivated from season to season and become harbors of contamination. The sterilization of the permanent frame requires unusual care and must include the soil between the boards and the steam pan. A regular change of site would be best, but removable frames and summer cultivation of all parts of the site would go far in the destruction of infected refuse. A general program of Bordeau spraying, moreover, appears necessary to prevent the infections that arise from a certain amount of seemingly unavoidable contamination on the part of workmen who lack the viewpoint of plant pathologists.

Black root rot (Thielavia basicola) such as could be readily detected by backward growth or first hand field inspection of roots was noted to some extent in about a third of the fields. In seven fields the losses varied from 10 to 30 per cent, and in 17 fields from one to 10 per cent.

Mosaic showed about normal prevalence in so far as comparison with other years is possible. Early infections resulting in some reduction in the size of plants ranged from a trace to 12 or 15 per cent of the stands, with losses of a trace to 4 or 5 per cent. In only two cases observed did the loss exceed 10 per cent. It is not uncommon for suckers to exhibit uniform infection over considerable parts of a field on account of the transmission of the disease in topping, but such infection is usually too late to be serious. After harvest, the suckers appearing upon the old butts may show 100 per cent infection over whole fields. Flea beetle infestation has been serious in Pennsylvania this season and no doubt these insects helped to give mosaic its general late prevalence. Weed carriers that appeared to be sources of mosaic were two species of Physalis that were more or less common on many farms and showed mosaic to a great extent. Infected horse nettle and Jimson weeds were seen occasionally.

At least a trace of ring spot was observable in nearly all fields, while limited areas in some fields showed most of the plants infected.

TOBACCO DISEASE FIELD SURVEY IN WISCONSIN, 1931

James Johnson

The 1931 tobacco growing season in Wisconsin was characterized by both unusually dry and unusually hot weather. The rainfall was quite variable and some localities received what appeared to be sufficient precipitation, but the high temperatures over long period apparently dispelled the expected benefits in most cases. The crop as a whole was therefore comparatively short and actually good crops were comparatively rare.

As a consequence of these weather conditions typical "brown root-rot" symptoms which are normally very common and conspicuous in this state were not strikingly evident. It seemed apparent, however, that while the damage was relatively as great as in a normal year, the chlorotic symptoms of the disease were first of all directly "masked" by the environment and secondly the stunting was made less conspicuous due to the poorer development of the non-affected fields or portions of fields.

Black root-rot due to Thielavia basicola, which is well known to be checked by high soil temperatures, was reduced to such an extent that it was difficult to find any good field evidence of its relation to crop production.

Wildfire (Bacterium tabacum) and black-fire (B. angulatum) were also conspicuous by their absence in the field. Wildfire was known to exist in only twelve fields at the time of planting and only a very limited upward spread developed in two or three of these cases. Blackfire, though very common in the seed beds, was found only very rarely in the field up to September 5, and no special loss could be attributed to the disease.

Ordinary tobacco mosaic was very common. Several fields or parts of fields showing practically 100 per cent infection were found. In only one of these fields could infection be traced to the seed beds. In the remainder it was evident that the infection had in practically all cases come from the field soil. Much of the heavy spread of mosaic in the field during this season was, however, evidently brought about by the extensive "hand-worming" operations, usually only a minor field practise in Wisconsin.

The 1931 crop suffered considerably from wind injury in the southern section. Hail injury was limited to a comparatively narrow area in Dane County. Heavy frost hit almost the entire northern district on the night of August 29, when only about 25 per cent of the crop was harvested. While some fields escaped appreciable injury, the damage was almost complete in other fields.

VEGETABLE DISEASES

DROUGHT INJURY TO CABBAGE IN NEW YORK

Charles Chupp, Oct. 23.

A brief survey was made this week of cabbage fields in Cortland, Tompkins, and Monroe counties and material was sent in from Chautauqua, Erie, Chenango, and Genesee counties. Nearly all of the Danish cabbage fields looked unusually well until about a month ago, when the lower leaves suddenly began to wilt without much loss of color and finally dropped off. In fields where the trouble was most severe nearly all of the stem leaves and some of the outer leaves on the head had fallen. Where this leaf drop had occurred early secondary sprouts had grown out from the stalks so that the symptoms were very much like those of black rot. In cases where the leaves did not drop but turned somewhat yellow, so many spots of Alternaria brassicae occurred on the foliage that additional leaves were killed. Another symptom was numerous black specks, both on the leaf blade and on the midribs and veins, of the outer leaves of the head, with very much the appearance of black speck as described by Ray Nelson and F. C. Stewart. Sometimes these black spots extended for some distance into the head. In still other cases the inner leaves had become dark and slimy and in a few plants the pith of the stem had become a softened mass.

The cause of all this trouble seems to have been the extremely hot weather late this fall, together with a rather extended drouth. At least I can find no other reason for the sudden dying and dropping of the leaves. No black leg nor black rot was present in many of the fields which showed the worst type of injury.

The theory that the heat and drouth were the direct cause of the trouble is further substantiated by the fact that in the fields where late and deep cultivation was practiced the trouble is much more severe than in immediately adjoining fields where cultivation was stopped early or where shallow sweeps rather than deep shovels were used. Furthermore the trouble was much worse in places where the cabbage worms, the loopers, and the grasshoppers had eaten many holes in the leaves. It also seemed worse in the fields where row applications of fertilizers were made in addition to broadcasting of the fertilizer materials.

The weakened condition of the plant permitted the Alternaria to grow until many of the leaves were turned black because of the almost continuous layers of fruiting bodies. The holes eaten by the insects also permitted the advent of Bacillus carotovorus, which evidently caused the many black specks on the inner foliage, since when such foliage was placed in a warm moist place, a watery ill-smelling soft rot occurred

following these spots.

This seems to be the first time in the 19 years that I have been in the state that such effects were noticeable on the cabbage crop. The weather reports are being studied with the hope that some light can be thrown upon the exact combination of weather which caused this great amount of injury. Where the men planted early, stopped cultivating soon, and had no worm injury of the crop, the plants looked almost normal. Certain other fields will have fully 90 per cent loss and there are a few isolated cases where the crop will not be harvested. It would seem, from the survey which I made and from the letters which have been sent me by growers, that the loss for the state would be almost 10 per cent of the Danish crop.

DISEASES OF TREES

A NEW ELM DISEASE

By Curtis May

In a short article which will be published in Science, Curtis May of the Ohio Agricultural Experiment Station reports the discovery of a new disease of elm trees. The following note is condensed from a manuscript transmitted to the Survey by G. F. Gravatt of the Division of Forest Pathology.

After the identification of the Dutch elm disease in Ohio, during the summer of 1930, some 300 specimens of diseased elm trees were collected or received from correspondents and examined at the Dutch Elm Disease Laboratory operated by the Ohio Agricultural Experiment Station and the Division of Forest Pathology, Bureau of Plant Industry at Wooster, Ohio. It was found that a certain fungus was present in a little over 10 per cent of the cultures made. Indications were that the trees from which this fungus was isolated were probably parasitized, some dying entirely during the summer of 1930 and others losing part of their tops.

Soon after growth began this spring, fourteen young elms were inoculated with the fungus. About a month after inoculation, symptoms of disease appeared on seven trees. Drooping and wilting of the leaves, preceded or accompanied in most cases by a distinct yellowing was first noted. In a short time most of the leaves dropped although some leaves turned brown and remained on the twigs for more than a month. The diseased twigs and branches died as well as the main trunk above the point of inoculation. A blackening of the bark, which in a few cases extended directly up the trunk from the point of inoculation was noted on some trees. Branches below the point of inoculation, with a few exceptions remained healthy. The entire top of one tree, inoculated at the base, died.

A brown discoloration of the cambium and current growth of sapwood was evident in cross sections of the diseased branches. The staining in the inoculated trees was more uniform and somewhat more diffused than that found in trees affected with either the Dutch elm disease or Verticillium wilt. However, the discoloration in some cases resembled that of the two latter diseases markedly.

The fungus was reisolated from the inoculated diseased trees but not from inoculated trees which did not develop the disease, although attempts were made to do so. Check trees remained healthy. The fungus is tentatively referred to Cephalosporium. No difficulty is experienced in distinguishing this fungus from Graphium ulmi Schwarz.

The fungus was cultured from specimens sent to the Dutch Elm Laboratory from Iowa, Missouri, New York, and Washington, D. C., as well as from various localities in Ohio. A more detailed study of the disease and the fungus is in progress.

BLISTER RUST IS SPREADING IN THE EAST

Roy G. Pierce, in the Blister Rust News (p. 213, vol. 15, no. 9, Sept. 1931), reports that blister rust has been found on Ribes in Maryland, Virginia, West Virginia, and Ohio, and immature rust cankers on pine have also been found in Maryland and Iowa. Following is a summary of these discoveries:

Maryland: additional infections found in Washington County, on Ribes rotundifolium and also on white pine. Found on R. nigrum, R. sativum, and R. cynosbati in the adjoining Allegany County.

Virginia: found at two places, one in Frederick County, the northermost county in the State, the other in Rappahannock County, both on R. rotundifolium.

West Virginia: on R. rotundifolium in two places, in Tucker and Randolph Counties.

Ohio: found at 5 places in 3 counties; on R. cynosbati and R. nigrum in Ashtabula County adjoining Pennsylvania, on R. nigrum in Geauga County, and on R. cynosbati in Fulton County in the extreme norwestern corner of the State.

Iowa: several specimens of Pinus strobus showing discoloration were found in the Forest Nursery at Ames. This early stage of the blister rust on pine was identified through a microscopic examination of a section of the bark.

CHESTNUT BLIGHT IN INDIANA

The chestnut blight caused by Endothia parasitica was found on the native chestnut (Castanea dentata) in southern Indiana near Louisville, Kentucky. (Roy G. Pierce, Sept. 29.)

D I S E A S E S C A U S E D B Y N E M A T O D E S

THE FINDING OF HETERODERA SCHACHTII, THE SUGAR BEET NEMA, ON POLYGONUM IN VIRGINIA

In this country Heterodera schachtii, the sugar beet nema, has been recorded only from regions where the sugar beet is grown. Its occurrence on two native plants, Polygonum pennsylvanicum and punctatum, in Virginia is therefore most remarkable. The locality in which these infested plants grew is a little creek near Broad Run between Tysons Corners and Leesburg. The discovery was made quite accidentally while looking for another parasitic nema, a new Tylenchus species which produces bluish lesions in the roots of Polygonum pennsylvanicum. Both species of Polygonum mentioned grow in the moist, sandy and gravelly bed of this creek, which runs for a short distance through a rather open pine wood that is used as a pasture. No other plant species of the surrounding vegetation was found infested with this sugar beet nema. On the ground bordering the creek all Daucus carota plants were affected with Caconema radicicola, the root knot or root-gall nema. (G. Steiner)

ROOT KNOT ON PEANUT

G. A. Meckstroth and J. R. Christie found a heavy infestation of root knot on peanuts near Chadbourn, North Carolina, on August 26. The peanuts had been planted in a portion of a strawberry field where the strawberry plants had died out last year. The stand was poor and the plants were pale yellowish green and much stunted. On some plants no nuts had set.

The peanut is generally considered to be rather resistant to the root knot nema, Caconema radicicola. Dr. G. Steiner, who verified the determination, makes this remark concerning resistance, "Eventually any population of the root-gall nema may adapt itself to a given host to such an extent that even such hosts as the present, which is called somewhat immune, may be heavily attacked."

MISCELLANEOUS NOTES

Sternbergia lutea (Zephyranthinae, Amaryllidae) imported from Istambul and collected in Asia Minor, where it grows wild, was found infested with Tylenchus dipsaci, the bulb or stem nema. Sternbergia is a new host and Asia Minor a new country for this pest.

Piper methysticum ("Kava") from Papeari, Tahiti, Society Island is a new host for Caconema radicicola, the root knot or root-gall nema. (G. Steiner)